Faculty of Applied And Creative Arts

The Uncanny Valley Theory and Application Towards Film and Animation

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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ABSTRACT

The 'Uncanny Valley' theory is an idea pioneered by Masahiro Mori in 1970 regarding the psychological effects of lifelike robotic (Mori, 1970). The definition of the uncanny valley implies that a humanoid target emerges in witnesses, and looks closely but not quite like human beings uncannily, or curiously similar. For decades, animation companies such as Pixar prefer to go for stylized animations instead of realistic animations to avoid negative audience reactions (Wolchover, 2011). This could be due to Masahiro's uncanny valley theory. Furthermore, even though there are multiple studies conducted with robots and still images of digital characters, the number of researches which focus on existence of uncanny valley in animation and film is still limited. Which means, either uncanny valley theory is important or not and is it the uncanny valley theory can give the effect to the animation itself? This unresolved problem is led to confusion among animators. This study aims to accomplish three goals: 1) identify the relationship between the uncanny valley with animation and film; 2) identify the effectiveness of uncanny valley theory in animation and film and; 3) To recommend the appropriate guideline for animators to overcome the uncanny valley effect in order to produce realistic animation and film. Other than that,this research will be conducted using Survey Research Method. Based on result of 123 participants, this research can be concluded that, when the character was very familiar to the audience, the more discomfort feeling when looking at the character after it builds with the CGI. The main objective of the study is to analyse the effect of the uncanny valley on the animation. This research is beneficial to the CGI industry (visual effects and post-productions) to create more details, realistic characters to attract audience attention, for bigger market sales.

Keywords: Animation, humanoid reality, uncanny valley, virtual reality, visual analysis

Teori "Uncanny Valley" dan Aplikasi Terhadap Filem dan Animasi

ABSTRAK

Teori 'Uncanny Valley' adalah idea yang dipelopori oleh Masahiro Mori pada tahun 1970 tentang kesan psikologi pada robotik yang bernyawa (Mori, 1970). Definisi 'Uncanny Valley 'mengimplikasikan bahawa sasaran humanoid muncul pada pandangan respondan, dan kelihatan sama tetapi tidak sama seperti manusia dengan secara tidak sengaja. Selama beberapa dekad, syarikat animasi seperti Pixar lebih suka untuk menghasilkan stylized animations dan bukannya animasi realistik untuk mengelakkan reaksi negatif penonton (Wolchover, 2011). Ini mungkin disebabkan oleh teori 'Uncanny Valley' Masahiro. Tambahan pula, walaupun terdapat banyak kajian yang dijalankan dengan robot dan imej watak-watak digital, bilangan penyelidikan yang menumpukan kepada kewujudan 'Uncany Valley' dalam animasi dan filem masih terbatas untuk mengetahui sama ada teori 'Uncanny Valley' penting atau tidak dan teori ini memberi kesan kepada animasi itu sendiri? Masalah yang tidak dapat diselesaikan ini menyebabkan kekeliruan di kalangan animator. Kajian ini bertujuan untuk mencapai tiga matlamat: 1) mengenal pasti hubungan antara 'Uncanny Valley' dengan animasi dan filem; 2) mengenal pasti keberkesanan teori 'Uncanny Valley' dalam animasi dan filem dan; 3) Untuk mengesyorkan garis panduan yang sesuai untuk animator untuk mengatasi kesan 'Uncanny Valley' untuk menghasilkan animasi dan filem yang realistik. Selain itu, penyelidikan ini akan dilakukan dengan menggunakan Kaedah Penyelidikan Kajian. Berdasarkan keputusan 123 peserta, penyelidikan ini dapat disimpulkan bahawa, ketika watak itu sangat 'familiar'kepada penonton, rasa tidak selesa itu akan menjadi ketika melihat watak setelah watak membina dengan CGI. Objektif utama kajian ini adalah untuk menganalisis kesan "uncanny valley" terhadap animasi Penyelidikan ini memberi manfaat

kepada industri CGI (kesan visual dan produk pasca produksi) untuk mencipta lebih banyak butiran, watak realistik untuk menarik perhatian penonton, untuk jualan pasaran yang lebih besar.

Kata kunci: *Animasi, realiti manusia, 'uncanny valley', realiti maya, analisis visual*

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LIST OF ABBREVIATIONS

ANOVA	Analysis Of Variance
ANS	Autonomic Nervous System
ASPD	Anti Social Personality
CGI	Computer- Generated Imagery
MYR	Malaysian Ringgit
SPSS	The Statistical Package for the Social Sciences

CHAPTER 1

INTRODUCTION

1.1 Background of Study

The theory of ' uncanny valley ' is an idea that Masahiro Mori pioneered in 1970 with regard to the psychological effects of lifelike robotics (Mori, 1970). Uncanny valley refers to a graph that compares human likeness and familiarity. The definition of an uncanny valley suggests that a humanoid entity which seems to evoke eeriness and disgust in observers almost, but not quite, as human beings uncannily or strangely well-known. As to its uncanny valley, the relationship is conceptual between the degree to which an entity resembles a human being and the emotional response to that object.

On the other hand, the term uncanny valley name refers to a point on a graph that maps a robot's human resemblance or virtual character in relation to its assumed familiarity, as an example in Figure 1.1. In the initial stages, the perception of familiarity increases as human resemblance increased, but at a certain level, when the likeness is viewed as being extremely similar and yet not adequately similar, the graph dramatically decreases to negative familiarity values. This is called the uncanny valley. The condition does not last long though. As the robot's human presence continues to grow, negative perceptions disappear and the robot becomes more recognizable once again (Mori, 1970, pp. 33-35).

Mori's graph was criticized for having trouble identifying which emotion accurately stands in opposition to familiarity, and for not actually defining the word "familiarity" as being an appropriate positive human reaction to person-like agent (Ho et al., 2008, pp.169-176).

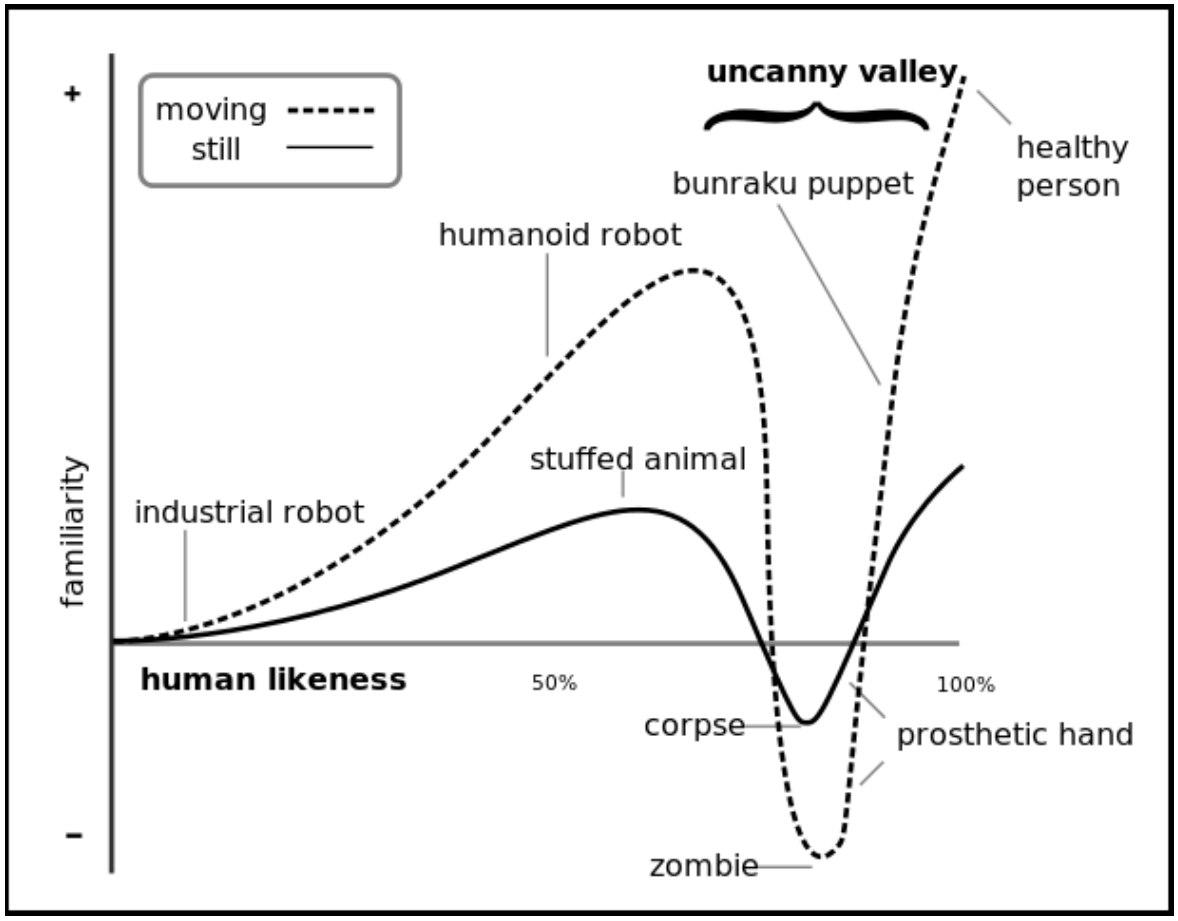

Figure 1.1: Uncanny Valley Graph (Mori, 1970)

Sources of these are robots, 3D computer animation and lifelike dolls. With the increasing generality of virtual reality, augmented reality, and photo-realistic computer animation, the 'valley' has been cited in the popular press in reaction to the realism of the creation as it approaches cannot be distinguished from reality.

As the massive advances of 3D graphics, motion capture, games engines, and robotics have brought about the prospect of a much more realistic representation of human appearance and movement, and the uncanny valley's nature has been challenged. Do the recent technological developments make the familiarity so high that we can avoid the valley completely?

People often scared of unfamiliarity when placed out of their own context, but in the genre of horror, for instance, this can be a good thing, usually because of the use of bone-chilling prothetics. For decades, dolls, masks and even advanced robotics have terrified humanity inside and out of the multiplex.

There has however been currently a lack of research into animation of the uncanny valley which can encourage the animators and animations studios, so that realistic animations cannot be avoided just to prevent the uncanny valley. This study seeks realistic animation which focused on overcoming the uncanny valley effect in animation. Finally, the main objective of the study is to analyse the effect of the uncanny valley on the animation.

1.2 Problem Statement

The convergence of technology, particularly 3D character animation, has opened up opportunities for developers, individuals and animators to explore a wide range of artistic explorations. Computer-generated modelling has become so sophisticated that it is difficult to tell where reality leaves off and where the digital representation of reality (or, more possibly, fantasy) starts. For decades, animation companies such as Pixar prefer to go for stylized animations instead of realistic animations to avoid negative audience reactions (Wolchover, 2011). This could be due to Masahiro's uncanny valley theory. Furthermore, even though there are multiple studies conducted with robots and still images of digital characters, the number of researchers who focus on existence of uncanny valley in animation and film is still limited which means, either uncanny valley theory is important or not and is it the uncanny valley theory can give the effect to the animation itself? This unresolved problem is led to confusion among animators.

1.3 Research Objectives

In the process of this research, there are several objectives that should be considered as research guides. The objective is important to determine the direction of the study. This direction can prevent us from being astray or distorted from the subject or the study. Among the objectives identified are:

i. To identify the relationship between the uncanny valley with animation and film.

ii. To examine the effectiveness of uncanny valley theory in animation and film.

iii. To recommend the appropriate guideline for animators to overcome the uncanny valley effect in order to produce realistic animation and film.

1.4 Research Question

Below are the research questions for this research:

i. Why the phenomenon of uncanny valley occurs when the objects and characters become very familiar to the audience?

ii. How the uncanny valley theory affecting the animation and become very important to the animation itself?

iii. How to overcome the uncanny valley effect in order to produce realistic animation?

1.5 Scope and Limitation

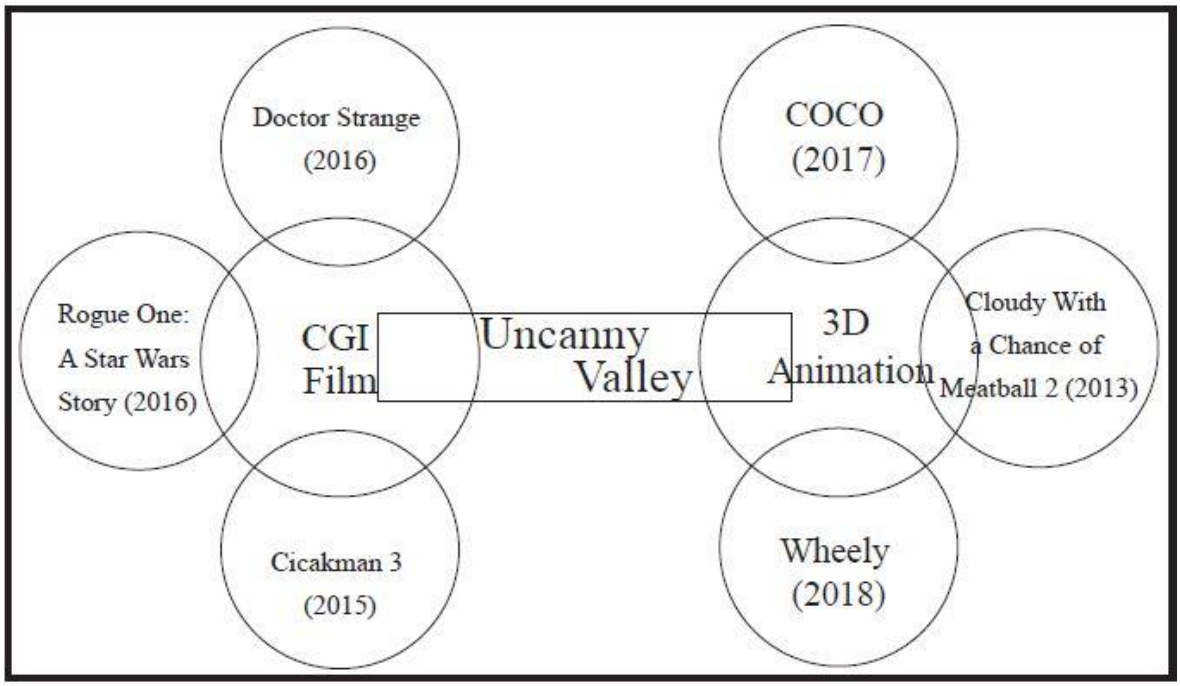

Figure 1.2: Scope of Study

This research was conducted to analyze the existence of the uncanny valley theory in animation and film case studies. This study only focused on the uncanny valley theory and 3D animation as well as CGI film. The main objective of the study is to analyze the effect of the uncanny valley on the animation. One of the limitations of this study is data collection was only collected and recorded from one country, Malaysia and all the participants were Malaysians. The results were also based on a limited number of stimuli which were consisted of the character from the chosen CGI film and 3D animation due to limited time for collecting the data from 123 respondents.

The characters chosen were from Doctor Strange, Rogue One: A Star Wars Story, Coco, and Cloudy with a Chance of Meatball 2 movie for Hollywood movies, meanwhile for Malaysian movies, the researcher chooses a character from Cicakman 3 and Wheely

(2018). A questionnaire had been distributed for this study. The informants of the interview were not restricted to the students from Universiti Malaysia Sarawak (UNIMAS) but also from related-industries professional. Lastly, the observation of the movies was to obtain the effect of the uncanny valley toward the animation itself.

1.6 Assumption

There are a few assumptions to be made toward the research problem:

i. The audience will understand more about the uncanny valley

ii. Uncanny valley can be avoided by improving animation techniques such as facial animation, realistic lighting, texturing and 3D scanning.

iii. Recommend guidelines to the animators to overcome the uncanny valley effect in order to produce realistic animation.

1.7 Significant of the Study

The increases in the animation demand provide a huge motivation to the animator to create a good animation. Therefore, it is advised that animators and animation studios do not avoid realistic animation just to escape the uncanny valley but rather to enhance their animation technique. Furthermore, this study will help the researchers for further discoveries. Thus, the animation will have many rooms for improvements.

1.8 Research Method

The research method used in this research is quantitative methods. The research method used in this research is divided into two parts; observation of some previous animated film and the online observation survey. Online observation survey considered as an interview

via an online survey form. It is more towards obtaining the opinion from the observation of the audiences. This method was carried out to determine whether the audience is able to understand the uncanny valley in animation and they were asked to give reasons to support their observation. Therefore, many information was being able to be gathered at this stage.

The study was then be continued by using the interview method. The interview via online survey form was be created by using Google form because there were many videos need to be shown in the survey. The survey form was classified into two parts: the personal information and the observation on the animated animation. The data was collected from the informant and analyzed in Chapter 4.

1.9 Chapter Organisation

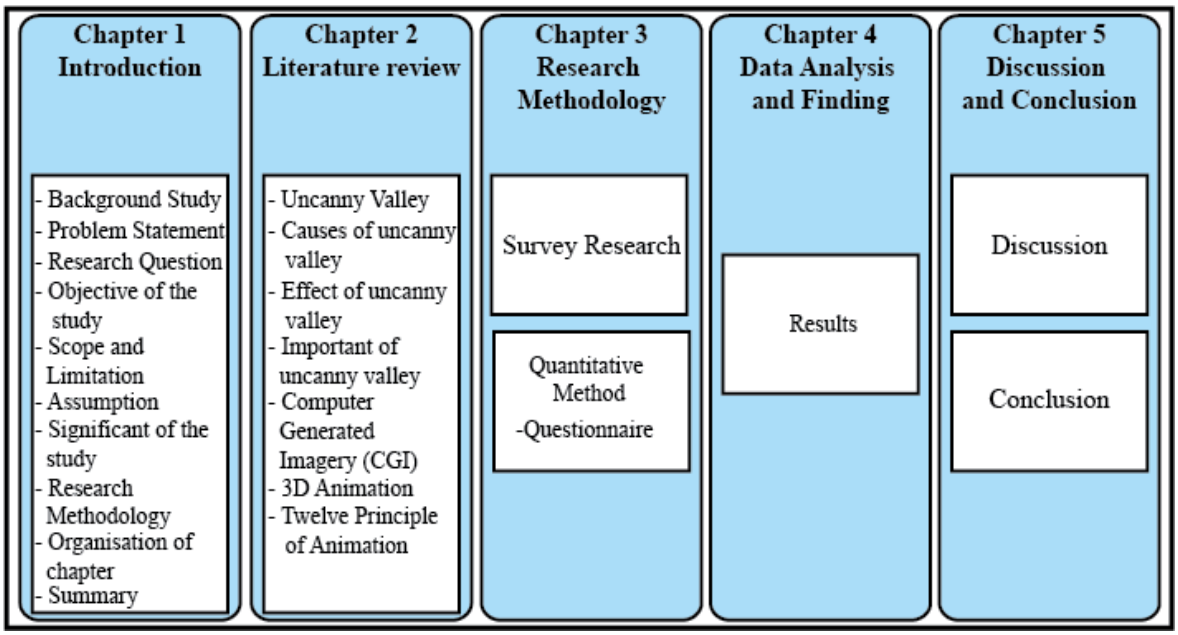

Figure 1.3: Organisation of chapter

This study comprises five chapters. Chapter 1 is the Introduction where it consists of the background study, problem statement, research questions, aims and objectives, scope and limitations, assumption, the significance of the research, research methodology and the